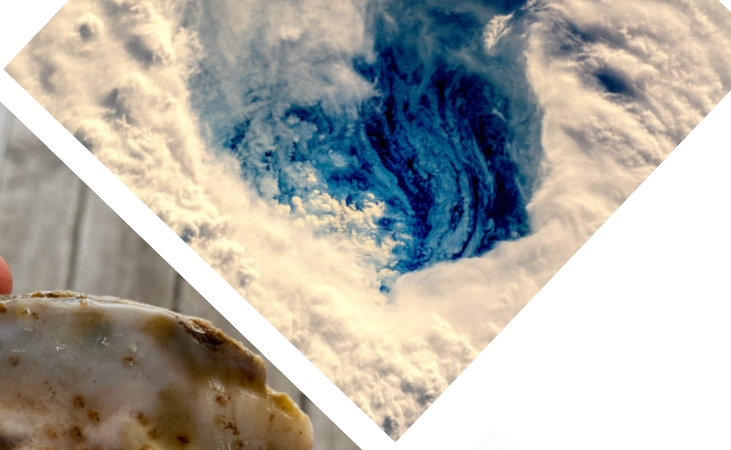

Sea Grant
North Carolina

STRATEGIC PLAN
2018–2023

North Carolina Sea Grant Strategic Plan 2018–2023

Contents

cover: shrimp, from *Mariner's Menu* (Vanda Lewis); fellow Melinda Martinez in the field (courtesy of her); spat-on-shell oyster (John Lambeth/NCFBF); Florence (NASA); fellow Haley Plaas in the field (M.May/UNC Research).

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Sea Grant
North Carolina

North Carolina Sea Grant Strategic Plan 2018–2023

MISSION

Through integrated research and outreach efforts, North Carolina Sea Grant enhances the sustainable use of ocean, coastal and watershed resources, benefitting communities, economies and ecosystems.

VISION

North Carolina Sea Grant is a key leader in addressing the state's urgent and long-term needs in ocean, coastal and watershed resource management. The program shares sound science, develops educational excellence, and builds extensive and effective partnerships.

INTRODUCTION

North Carolina Sea Grant is an inter-institutional program of the University of North Carolina system. This partnership between the National Oceanic and Atmospheric Administration and the state of North Carolina is one of 34 Sea Grant programs across the nation, and a library, administered by the National Sea Grant College Program. North Carolina Sea Grant focuses on: research to support resolution of state, regional, and national coastal resource-management challenges; outreach via extension and communications teams who support the development and transfer of resulting technologies and applications as well as those from collaborations with local partners; internal program management, including grants administration; and educational programs that support a strong knowledge foundation for a mix of stakeholders, such as the academic community, government officials, businesses and industries, K-12 teachers and students, and the public.

Across five decades, North Carolina Sea Grant's innovative programs have addressed the state's coastal resource priorities. The program is a nationally recognized leader in forging strong, long-term collaborations that link research portfolios of North Carolina's public and private universities with a variety of critical state, local and regional needs. North Carolina Sea Grant drives sound science, as well as strong relationships and partnerships in communities that support the program's co-creation of applied solutions at local, state, and regional levels. With its headquarters at NC State University and three coastal offices, the Sea Grant team readily shares expertise with many

partners, reinforcing its outstanding track record in communicating science and policy information to many audiences via a cadre of specialists, targeted products and engaging events.

Changing Demography

North Carolina continues its overall growth trajectory. The total population went over the 10.5 million mark in 2019 and is projected to top 10.6 million people in 2020, thus ranking the state ninth in the nation according to recent estimates from the U.S. Census Bureau. Across the nation, North Carolina had the fourth largest population increase since 2018 with only Texas, Florida, and Arizona gaining more residents over the past year. With a growth rate of 1.0% since 2018, North Carolina grew twice as fast as the national average (0.5%) and was the 10th fastest-growing state.

Much of the growth continues to be in inland metropolitan areas that are home to headwaters for watersheds of coastal rivers. The largest coastal city, Wilmington, at the mouth of the Cape Fear, has an estimated population of 126,669 in 2020, and is the eighth largest city in North Carolina. Wilmington's population has increased by 18.7 percent since the most recent census in 2010.

North Carolina, in fact, is a tale of two states in one. A few oceanfront counties — such as New Hanover County, home to Wilmington, and adjoining Brunswick County — are seeing significant population increases expected to continue with current estimates at a 21% increase by 2030. That growth includes an influx of retirees, a group that also may bring social, health and economic challenges and opportunities in the long run. At the same time, 10 of the 20 counties in the state's Coastal Area Management Act region are expected to have population losses reflected in the 2020 Census, according to projections from the N.C. Office of Budget and Management. Most of the coastal plain does not reap the benefits of oceanfront tourism. Many counties are losing early-career adults in search of jobs. Meanwhile, local officials continue to seek sustainable economic development. North Carolina and its coastal region also are becoming more ethnically diverse. Sea Grant research coupled with integrated extension and communication efforts will reflect such changes and strive to meet a variety of information demands.

The COVID-19 pandemic will continue to impact all aspects of North Carolinians' lives. North Carolina Sea Grant is committed to working with state partners and local communities to flexibly adapt program priorities and utilize a variety of technologies to address the near-term and anticipated long-term impacts. The pandemic poses new hurdles for communities, as well as how researchers and extension team members can safely interact with stakeholders to continue to support them. These changes in ability to interact increase challenges of engaging underrepresented and vulnerable individuals and communities, populations that already had disproportionate economic and other impacts before the pandemic. COVID-19 impacts not only include health considerations, but also significant economic and potential environmental considerations. Some impacts will be long lasting, and will shape the future landscape of communities, economies, industries, and governments.

The pandemic has reflected how Sea Grant is nimble, able to adjust its activities to meet new challenges and shifting priorities while meeting our overall mission and vision. Already, many ways of doing business are changing and many changes are likely to be permanent. Extended economic impacts are yet to be fully realized, and other negative impacts are anticipated to be widespread for years to come, including reductions in state investments, resulting in potential capacity reductions not only for North Carolina Sea Grant, but also for many state, local and community partners. Thus, the importance of building partnerships and leveraging expertise and resources has never been more evident.

CORE VALUES AND PRINCIPLES

This updated strategic plan, now informing our work through 2023, will guide our program's investments to respond effectively to urgent and long-term challenges and opportunities. Those efforts will benefit communities, ecosystems and economies across the state, region and nation.

North Carolina Sea Grant champions the values of diversity, equity, and inclusion. In order to expand, innovate, and maximize our program's effectiveness, we recognize we must embed these values in our organizational expectations and daily operations. In addition, as North Carolina's population continues to grow and diversify, our program's relevance in the state increasingly will rely on how well we embody diversity, equity, and inclusion. We also recognize that societal barriers and challenges mean that we must initiate intentional measures if we hope to fully realize diversity, equity, and inclusion in all aspects of our programmatic portfolio. Our program will continue to strive for diversity, equity, and inclusion by:

- Proactively recruiting, retaining and preparing a diverse workforce that reflects diversity across all levels of our organizational structure.

- Engaging and serving communities and stakeholders who are representative of the broader populations where our programs operate.

- Creating and facilitating research opportunities that equitably fund under-targeted and underserved universities, faculty and students; and foster research with real-world outcomes that benefit underserved communities.

These investments and commitments will inform the way our team works to address the strategic plan focus areas and associated outcomes.

In addition to our program's commitment to diversity, equity and inclusion we will execute our mission based on core values and cross-cutting principles including:

- Identifying emerging and ongoing needs in partnership with coastal communities, as well as seeking innovative opportunities and solutions.

- Embracing interdisciplinary and collaborative approaches that incorporate

research, outreach and education to address complex challenges.

- Supporting sound science through merit-based peer review of research results
- Developing cadres of cross-trained students across multiple disciplines to develop the next generation of experts on coastal topics.
- Translating and communicating science-based information, solutions, and best practices in an accessible and inclusive manner for a range of stakeholders so that they can make informed decisions and educate future generations.

These values are integral to the program's organizational approaches and constant self-evaluation. We reinforce them through professional development within our team, as well as the strong connections across our portfolio of projects and activities. Our program's management team and all our professionals integrate these core values throughout their duties. We adapt our operations as we draw on information from our own DEI committee, the North Carolina Sea Grant Advisory Board, state and federal agencies, and partners in academia, local governments and communities, business and industry, and other organizations.

FOCUS AREAS

To meet our mission and to continue to expand our impacts in supporting the ocean, coastal and watershed resource management needs of the state, North Carolina Sea Grant will concentrate efforts in the following strategic areas:

- **Healthy Coastal Ecosystems**
- **Resilient Communities and Economies**
- **Sustainable Fisheries and Aquaculture**
- **Environmental Literacy and Workforce Development**

These focus areas, along with respective goals and outcomes, arose from an in-depth process that included a series of facilitated, stakeholder strategic-planning focus groups in 2015-16; a statewide online survey that reached new audiences; and national perspectives from the National Oceanic and Atmospheric Administration and National Sea Grant College Program. This plan was updated in 2020 through discussions with the North Carolina Sea Grant Advisory Board and North Carolina Sea Grant's experienced research, extension and communication team members to ensure state-based applicability and relevance.

North Carolina Sea Grant is committed to program advancement in each focus area by explicitly integrating a spectrum of activities. Thus, our goals and desired outcomes position the program to leverage current capacity, expand and develop new partnerships and funding avenues in support of program goals, and extend program

investments to new challenges and opportunities in North Carolina's natural resource management. As designed, these focus areas are synergistic, each building upon and complementing one another for program efficiencies and effectiveness. Additionally, North Carolina Sea Grant is a trusted partner for local communities, including county and municipal governments, and the program will continue to grow in facilitation and co-creation, engaging with and listening to local priorities and incorporating their on-the-ground perspectives into Sea Grant research and outreach investments.

HEALTHY COASTAL ECOSYSTEMS

Healthy coastal ecosystems and economies are the foundation for life along the coast. However, coastal development, current land-use practices and other human activities are contributing to water-quality degradation and human health impacts, as well as the decline of aquatic and terrestrial habitat for fish and other species, wetlands loss, and proliferation of invasive species. As many partners work to restore and maintain these ecosystems, such threats, along with heightened challenges arising from climate change, need to be better understood in order to provide a foundation for initial steps in developing adaptation and mitigation strategies.

Seeing the links between healthy ecosystems and sustainable economic development, North Carolina Sea Grant is a key partner in drawing attention to the emerging concept of the Blue Economy — a sustainable ocean and coastal economy that reflects the long-term capacity of those ecosystems to support human activities, and also to remain resilient and healthy.

Considering the significant economic investment and potential returns, it is vital to provide protection and restoration efforts, including natural or nature-based solutions that seek to achieve ecosystem function and deliver value. Working with partners in academia, industry and agencies, and within local communities, our Sea Grant team plays a key role in listening, prioritizing, identifying and assessing impaired ecosystems, and supporting the co-development of potential policies, technologies and processes with these partners that lead to improvement of watershed, coastal and ocean ecosystems. This will be accomplished through rigorous natural, physical and social science approaches that work synergistically to advance the knowledge of coastal ecosystems. Regional or multi-state projects also will be a part of our Sea Grant portfolio, to recognize that watersheds and ecosystems extend beyond government boundaries. North Carolina Sea Grant will work to expand research efforts and investments that support this focus area in response to recent federal review suggestions.

The final component of healthy coastal ecosystems is successful outreach. Sea Grant team members and partners across the state involved in research work closely with our extension and communications specialists. Together, they actively engage and listen to residents, community leaders, and policy makers to prioritize communication products and best approaches to translate the latest ecosystem knowledge into practice, and maximize the benefit to humans and ecosystems, at the coast and upstream.

Healthy Coastal Ecosystems Goal 1

A combined human/natural systems/watershed approach, focused on present-day and emerging ecosystem conditions, creates and supports the generation of new knowledge and applications.

Outcomes

- Applied and interdisciplinary research is co-developed with partners, including community members, and is supported to assess the health, function, threats to and resilience of coastal ecosystems, communities, and individuals.

- Upstream outputs (e.g., sediment, nutrients, toxins, plastics, flows) are coupled to downstream impacts to improve watershed scale understanding and impacts on coastal ecosystems, communities, and individuals.

- Habitat changes through time are quantified and linked to drivers, such as climate change, changing land-use, and restoration practices.

- Ecological and economic impacts of adaptation, restoration and policy activities are better understood using existing and newly developed methodologies and technologies.

Healthy Coastal Ecosystems Goal 2

Habitat protection, restoration and economic benefits are maximized through applied research and outreach.

Outcomes

- Resource managers, design professionals, coastal residents, community leaders, industries and local officials are collaboratively engaged to strengthen the translation of research to applications related to habitat functions in order to increase understanding of ecosystem benefits — environmental, social and economic — via innovative communication products and engagement techniques.

- Demonstrations of innovative technologies, sustainable designs and restoration practices including natural and nature-based approaches are executed and evaluated in collaboration with diverse partners across the coast and inland.

- New partnerships are developed to identify coastal ecosystem issues and opportunities, cultivate citizen scientists, prioritize community-driven projects, and increase awareness of our program's products and expertise.

- New tools and outreach programs based on research results support decision making and environmental literacy and are accessible and co-developed with

communities that represent the diversity of coastal North Carolina.

These goals and outcomes correspond with performance measures of the National Sea Grant College Program:

- Number of resource managers who use ecosystem-based approaches in the management of land, water and living resources as a result of Sea Grant activities.

- Number of acres of coastal habitat protected, enhanced or restored as a result of Sea Grant activities.

RESILIENT COMMUNITIES AND ECONOMIES

Offshore, nearshore, coastal, estuarine and watershed environments shape the social and economic characteristics of North Carolina's coastal communities — including, but not limited to, neighborhoods, rural and unincorporated communities, and formal towns, cities and counties. Related economies depend upon water resources. Increasingly, these communities are recognizing that ecosystems must be healthy and robust to support varied uses.

Natural and human-made risks can threaten lives and livelihoods and built environments for those who live, work and play along our coast. Natural risks include erosion and extreme weather events, coastal storms and related surges, sea-level rise, flooding and drought. Risks with human-made causes or components include chemical and other spills, climate change (also including sea-level rise), economic crises, and unpredictable public health disasters as brought to light by the COVID-19 pandemic. Risks may be short-term events or unfold over longer time scales, with impacts felt locally, throughout North Carolina and beyond. The abilities of individuals, communities and industries to remain resilient to those dynamic risks will require an understanding of mitigation and adaptation strategies and implications that may impact the ways they live, plan, build, develop, and do business, thus preventing damage from, or taking advantage of, changes. This is especially challenging as populations and economic drivers continue to change along the coast and impacts are likely to be heavier in the rural and underserved coastal communities of North Carolina. North Carolina Sea Grant will provide physical and social science research to support coastal economies and communities — and offer them technical assistance to plan for and adapt to natural and man-made risks.

The potential for increased number and intensity of extreme weather events, sea-level rise, flooding, oil spills, and other natural and human-made hazards places N.C. coastal communities at greater risk. That results in greater vulnerability for many residents — for people of all ages, abilities and incomes, and particularly for those who are traditionally underserved — as well as for businesses and critical infrastructure. Coastal communities, residents and visitors, and businesses need a trusted understanding of their risk and its implications in order to make informed decisions that best protect lives and property and promote the sustainable use of resources and resilient

economies. Individuals, businesses and communities need to develop comprehensive preparedness, resilience and response plans, including strategically integrating multiple plans (e.g. hazard mitigation plans, emergency response plans, health care plans, transportation plans, water management plans). Also, communities must be able implement those plans and, when necessary, respond effectively.

Sea Grant can contribute to this planning by building a sound knowledge base to improve forecasting capabilities; analyzing and addressing social vulnerabilities and disparities; identifying development and best management practices that reduce the vulnerability of people, infrastructure, businesses and communities to coastal hazards; and by advancing ways communities can mitigate, adapt, manage and recover from these events. Sea Grant works with partners to identify barriers — financial, informational, cultural and legal — to effective planning, as well as challenges in implementing local policies and solutions when multiple property owners, decision makers and managers are involved. North Carolina Sea Grant will work to expand research efforts and investments that support this focus area in response to recent federal review suggestions.

Resilient Communities and Economies Goal 1

Resilient coastal economies are supported by a diverse range of existing and emerging sectors that enable sustainable use of marine and coastal resources.

Outcomes

- Research results assist coastal communities to identify, evaluate and support the roles of traditional business and industry, as well as emerging sectors in diverse coastal economies.

- Communities understand needs and opportunities for preserving cultural heritage and coastal access; increasing the value of sustainable water-dependent industries, including working waterfronts, recreation and tourism; and encouraging emerging sectors with environmentally and economically sustainable business practices.

- Communities engage in technical planning based on best available information that will support diversified, sustainable and resilient economies, ecosystems and communities.

- Outreach programming engages communities in co-developing an understanding of how planning and management decisions affect ecosystem and human health, how degraded coastal ecosystems can negatively impact human health, and how healthy coastal ecosystems can support profitable local business and industry.

- Communities engage in technical assistance programs that include decision-support tools that reflect their needs and priorities and enable them to consider

integrated strategies for resource management, along with best management practices.

Resilient Communities and Economies Goal 2

Communities and individuals understand risks associated with living, working and doing business along the coast and in coastal watersheds, and make informed decisions for efficient use of land, energy and water resources to sustain coastal ecosystems and economies.

Outcomes

- Interdisciplinary research and outreach — including natural and social sciences, law, policy and the arts — are used by our team and collaborators to better understand and evaluate risks to communities, including physical and social vulnerabilities to natural and human-made hazards.

- Communities are better prepared to plan and implement adaptation strategies to increase resilience, including support for community-level planning efforts that require increasingly integrated efforts for coordinated responses (e.g. hazard mitigation plans, comprehensive emergency preparedness and response plans, health care planning, transportation/infrastructure planning, water management plans, building codes, etc.), as well as assessments of how vulnerability to hazards may impact local economies, infrastructure and a spectrum of populations.

Resilient Communities and Economies Goal 3

Communities and economies have capacity to effectively prepare for, respond to, and adapt to the current and anticipated risks and impacts of hazards and catastrophes.

Outcomes

- Interdisciplinary research and outreach focusing on current, emerging and potential hazards provides strategies for coastal decision makers, communities, businesses and other stakeholders to plan, remediate, adapt and/or mitigate against damage exposure, or to accelerate recovery when/where the impacts are unavoidable.

- Communities have ready access to research-based information and best management practices through outreach efforts that assist them in identifying and planning for existing and future hazards.

- Local leaders, at the community, county and/or regional scale, understand opportunities to build in safety factors that also serve to help lower insurance costs, such as through the Community Rating System.

These goals and outcomes correspond with performance measures of the National Sea Grant College Program:

- Number of communities that adopt/implement sustainable economic and environmental development practices and policies as a result of Sea Grant activities.

- Number of communities that adopt/implement hazard resiliency practices to prepare for and respond to/minimize coastal hazardous events.

SUSTAINABLE FISHERIES AND AQUACULTURE

With increasing population growth and U.S. seafood consumption rates, expanding a domestic seafood supply is of great importance. North Carolina waters provide seafood to consumers via three main sources: the commercial fishing industry, a developing marine aquaculture sector and recreational fishing. A continued safe and sustainable seafood supply means each of these industries must be responsive to social and environmental needs, along with changing expectations of markets. Additionally, increasing consumer demands for fresh seafood provide an opportunity for educational efforts to increase consumers' comfort cooking seafood at home and continue to enhance in-state markets, including direct-to-consumer sales for North Carolina marine seafood products. The importance of supporting a strong supply chain and economic structure have come into greater focus as the pandemic brought restaurant closures and shifted consumer attention to retail and direct seafood sales for wild-caught and aquaculture products.

Effective conservation and management strategies of seafood resources are dependent upon the collection of basic, applied, and sometimes novel, scientific information. Currently, some North Carolina fish stocks lack sufficient data, particularly a direct index of abundance, on which to base policy decisions.

North Carolina's commercial fishing industry lands wild-caught seafood, and in many cases the fishing industry is part of the cultural fabric of smaller coastal communities. That annual harvest — tallying about 53 million pounds, worth about $87 million at the docks in 2019 — strives to meet demand for freshness, flavor and nutrition in seafood that consumers often find lacking in imports. Top species by dock value include blue crabs and shrimp. Meanwhile, marine aquaculture presents an opportunity to meet growing in-state consumer demand while also creating new jobs and helping local coastal economies. North Carolina's small, but growing, marine aquaculture industry now has a farm gate value of $2.9 million, based mainly on soft crabs, oysters and clams.

Each year, the for-hire recreational fishing industry, including charter and head boats, affords access to seafood to multitudes of anglers. Expanded research and extension programming with this sector would advance for-hire business operations, fishery management decisions, as well as tourism and marketing efforts for coastal communities. Marine recreational anglers took 17.5 million trips in 2019. Top species

landed include spotted sea trout, mahi mahi and bluefish. For every fish landed by an angler, two and a half are caught and released. Partners note that improved communication with these groups could enhance understanding and compliance with regulations, boost conservation efforts, and improve local economies in coastal communities and beyond.

This focus area requires a research and engagement strategy with commercial harvesters, aquaculture producers, recreational anglers, fishery managers, seafood consumers, commercial seafood buyers, and other stakeholders. These efforts seek to ensure a safe, sustainable seafood supply for the coming years.

Sustainable Fisheries and Aquaculture Goal 1

Improved science and management will advance conservation and sustainability of North Carolina living marine and estuarine resources and dependent ecosystems.

Outcomes

- New research approaches and strategies to collect essential fishery information and fill identified data gaps for managing living marine resources and aquatic ecosystems.

- Research and pilot testing of advanced technologies and techniques in fisheries science and data management will reduce research costs and support efforts by resource managers.

- Citizen-science projects collect monitoring and management data that would not be feasible using standard research practices, while also fostering marine stewardship and greater trust in scientific data.

- Research and outreach regarding technologies and fishing practices that reduce commercial bycatch and recreational fishing mortality are encouraged, developed, refined, and/or are implemented by partners and the public.

- Research that assesses environmental impacts and/or threats related to human activities — including seafood harvests; impacts of fishing activities, marine aquaculture; and introduction of non-native species — are supported, with results and data shared among partners to support and implement responsible and sustainable practices.

Sustainable Fisheries and Aquaculture Goal 2

North Carolina wild-caught seafood and marine aquaculture industries employ optimal business strategies, become more competitive in the marketplace, and provide economic benefits to coastal communities.

Outcomes

- Members of the public and fishing interests have varied opportunities to learn about competing uses for public-trust waters, including the siting and approval processes for shellfish leases.

- Research, development, and transfer of new and refined wild-caught seafood harvest and aquaculture production technologies are supported for existing and candidate species.

- Workforce and business development efforts result in stakeholders who are better equipped to initiate and manage new and expanding opportunities, and who can navigate hurdles resulting from rapid market constrictions, such as foreclosures and slowdowns during COVID-19.

- Innovative marketing and supply-chain approaches, including direct marketing to targeted audiences, are shared with coastal and inland businesses, to encourage services and products that enhance the economic value of N.C. seafood to fishermen and producers, restaurants, retailers and consumers.

- Businesses identify and define opportunities and problems by using qualitative and quantitative market-research techniques, including learning principles for adding value to marine seafood commodities, and resources for public- and private-sector guidance regarding various stages of product development.

- Harvesters, growers, processors, restaurant chefs, retailers, and regulators have opportunities to learn to prevent, eliminate, or reduce to safe levels various biological, chemical, and physical hazards that have public-health significance.

Sustainable Fisheries and Aquaculture Goal 3

Marine recreational anglers and other waterway users increase their understanding and appreciation of aquatic resources.

Outcomes

- Individual anglers, fishing clubs and organizations, and the for-hire charter industry members better understand management practices of, and opportunities for, stewardship in recreational fisheries.

- Infrastructure and business opportunities are identified in efforts to enhance marine recreational fishing opportunities, including improved community awareness of the social and other benefits associated with recreational fishing, such as participation by people of all ages, abilities and incomes, including minority populations.

- Recreational boaters have new sources of information regarding safety,

compliance with water-quality regulations, marine debris challenges and efforts to reduce the loss of fishing-related gear.

Sustainable Fisheries and Aquaculture Goal 4

Consumers are better educated about the value of eating North Carolina's wild-caught and cultured seafood, with related businesses building upon connections consumers have to seafood products and communities.

Outcomes

- Seafood consumers are educated and have the knowledge to evaluate the variety of seafood choices available to them, including wild-caught and aquaculture products, as well as a working understanding of fisheries management and seafood harvest and production practices.

- Seafood consumers better understand the nutritional benefits of seafood products; how to judge seafood quality at the point of purchase; and how to handle, prepare and/or cook seafood safely in the home.

- Chefs and other business leaders build business strategies related to N.C. seafood, including but not limited to tourism related to seasonality of seafood choices, recipes and cooking instructions, and fishing communities' heritage.

These goals and outcomes correspond with this performance measure of the National Sea Grant College Program:

- Number of fishermen, seafood processing or aquaculture industry personnel who modify their practices using knowledge gained in fisheries sustainability and seafood safety as a result of Sea Grant activities.

ENVIRONMENTAL LITERACY AND WORKFORCE DEVELOPMENT

North Carolina's future relies on the nation's ability to make choices that sustain our coastal and ocean resources for the benefit of communities, economies and ecosystems. By engaging with the public, North Carolina Sea Grant fosters an environmentally literate public that understands, appreciates and considers the health and sustainability of our coastal and ocean resources. We engage a wide diversity of participants and recipients for our environmental literacy and workforce development efforts, as we recognize that preserving, protecting and managing our state's coastal resources involve everyone living in and visiting North Carolina. We will continue to broaden our program's reach to piedmont and mountain audiences, and visitors to our coast. Our team works with partners to develop educational programs for a diversity of learners from young students to continuing education participants and lifetime learners.

We will continue our education investments, in and out of the classroom, by providing access to talented educators, skill-building experiences, career-enhancing opportunities

and tailored educational products. With those efforts, we will help develop communities and a workforce skilled in science, technology, engineering, arts and mathematics — also known as STEAM — to understand and solve complex coastal-and ocean-resource issues, and thus help to position North Carolina to compete economically at a global scale.

Fostering a spectrum of communications and engagement among a breadth of educational professionals and numerous stakeholders, including leaders in government, business and community organizations, will ensure effective information sharing. Outreach provides support needed for consensus building and also encourages informed decision making that considers a balance of economic and environmental priorities. North Carolina Sea Grant will continue to support existing partnerships and seek new avenues and partners to strengthen educational investments, with attention to those serving traditionally underrepresented groups across the coastal region, state, and nation.

Environmental Literacy and Workforce Development Goal 1

An environmentally literate public, elected officials, environmental influencers, and decision makers understand, appreciate, and consider the health and sustainability of our coastal watersheds, inner and outer coastlines, and near-shore ocean resources in their activities.

Outcomes

- Expanded access to up-to-date coastal and ocean research, extension and environmental educational materials is increased through a range of North Carolina Sea Grant outreach products (e.g., *Coastwatch* magazine, newsletters, and print, video and online products) that are developed, or adapted, and regularly used as education materials for multiple audiences in homes, classrooms, informal education facilities, festivals and other locations.

- User-defined workshop content (e.g. presentations, trainings) and continuing education programs are developed and disseminated in collaboration with formal and informal education facilities, and coastal industries. Materials are archived for future access.

- Outreach programs are developed to expand our reach to new and diverse audiences, including piedmont and mountain regions, underserved communities, and coastal businesses and industry.

- Local and state officials and policymakers are engaged, with appropriate partners, through targeted programming and communication platforms, to discuss and build greater understanding of scientific information; to provide law and policy briefings; and to share available tools to support decision making that incorporates social, environmental and economic considerations.

Environmental Literacy and Workforce Development Goal 2

Educators in K-12 settings and less formal educational settings have access to resources and training to bring coastal science, policy, and history to future generations.

Outcomes

- Curricula are developed and workshops and trainings delivered (e.g. train the trainer) that will equip educators with tools to build environmental literacy in classrooms, for at-home and distance-learning locations, and with other audiences. Those materials are archived for recurring access.

- An educational advisory group is established to inform the direction of North Carolina Sea Grant's educational programming as well as to evaluate use and utility by stakeholder groups to ensure ongoing adaptations to changing needs and requirements.

- Local, state, regional and national educational organizations partner with North Carolina Sea Grant to utilize educational products, thus magnifying the effectiveness and reach of educational products and activities.

- Hands-on and remote-learning research experiences, and additional interactions with investigators and graduate students, are developed for teachers and students across the state.

- Current and emerging distance-education technology is explored and developed to broaden the reach of educational training across multiple audiences throughout the state, including, but not limited to colleges, community colleges, and K-12 schools that serve underrepresented groups.

Environmental Literacy and Workforce Development Goal 3

The next generation of coastal and ocean professionals have scientific and technical skills and the business acumen needed to solve complex resource problems, support a robust coastal economy, and compete globally.

Outcomes

- Opportunities for interdisciplinary fellowships and research experiences for undergraduate and graduate students are expanded as a result of partnerships with diverse institutions and organizations across the state, region and nation.

- A greater pool of graduate and undergraduate students who represent a breadth of diversity (e.g. gender, race and ethnicity) are aware of, and apply to, our program's research funding and outreach opportunities.

- Professional training and retraining opportunities for students and adult

learners are developed and delivered to strengthen employability and opportunities for leadership roles after graduation (e.g. communications, grant writing and interview skills).

- Industry and business partners expand existing, or develop new, professional intern programs to support technical training and employment pipelines for current and post-graduate students at various levels — high school, community colleges and universities.

- Professionals receive or renew professional licenses and certificates as a result of North Carolina Sea Grant education and outreach programming.

These goals and outcomes correspond with performance measures of the National Sea Grant College Program:

- Number of Sea Grant products that are used to advance environmental literacy and workforce development.

- Number of people engaged in Sea Grant-supported informal education programs.

- Number of Sea Grant-supported graduates who become employed in a job related to their degree within two years of graduation.

CROSS-CUTTING IMPACTS

North Carolina Sea Grant's integrated research and outreach programs are designed to be cross-cutting and address multiple state focus areas, goals and outcomes as well as the national performance measures identified by the National Sea Grant College Program. In addition to the national performance metrics included within specific focus areas described above, North Carolina Sea Grant's research and outreach programming will address two additional performance measures of the National Sea Grant College Program:

- Number of Sea Grant tools, technologies and information services that are used by our partners/customers to improve ecosystem-based management.

- Economic and societal impacts derived from Sea Grant activities (market and non-market; jobs and businesses created or sustained).

CONCLUSION

North Carolina Sea Grant is committed to providing timely research regarding coastal resources and policy, as well as dissemination of research results, products, tools and technologies to multiple stakeholders, including but not limited to state and local decision makers, industry practitioners, community leaders and the public. Our program has a tradition of engaging with — and will broaden our collaborations with — diverse partners across the state, region and nation so that North Carolina's communities, ecosystems and economies will thrive now and into the future.

Our Team

North Carolina Sea Grant is headquartered in Raleigh, on the campus of North Carolina State University. In addition, we have extension offices at East Carolina University's Coastal Studies Institute in Manteo, the North Carolina State Center for Marine Sciences and Technology in Morehead City, and University of North Carolina Wilmington's Center for Marine Science.

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